

PATENT SPECIFICATION

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(54) EDIBLE PRODUCTS

(71) We, UNILEVER LIMITED, a company registered under the laws of Great Britain, of Port Sunlight, Wirral, Cheshire, England, do hereby declare the invention, 5 for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The invention relates to savoury flavours for foods.

It has been found that flavouring substances capable of imparting to foodstuffs a savoury flavour particularly resembling 15 that of cooked meats, may be obtained by reaction of a monosaccharide, hydrogen sulphide and one or more amino acids in the presence of water at an elevated temperature.

20 The invention comprises a process for preparing a flavouring substance which comprises reacting together a monosaccharide or a polysaccharide capable of giving a monosaccharide under the reaction conditions, one or more amino acids and hydrogen sulphide or a substance giving rise to hydrogen sulphide under the reaction conditions, in the presence of water at a temperature above 60°C until a flavouring 25 substance is produced, the pH of the reaction mixture being not more than 7 at the end of the reaction.

The monosaccharide in the process of this 30 invention can be a pentose such as ribose, arabinose or xylose or a hexose such as glucose. Pentoses are generally preferred to hexoses since pentoses give rise to savoury/meaty flavours under less vigorous 35 conditions. If a hexose such as glucose is used in the absence of a pentose a longer reaction time is likely to be required to prepare a similar flavour. A mixture of monosaccharides, for example a mixture containing pentoses and hexoses can be used.

40 45 Di, tri or polysaccharides which yield the required monosaccharide under the conditions of the reaction can also be used.

The hydrogen sulphide can be in the form of hydrogen sulphide gas, passed through an appropriate mixture of amino acid and sugar, or conveniently the required amount of hydrogen sulphide can be generated in situ from a suitable precursor which liberates the appropriate amount of hydrogen sulphide under the conditions of reaction. Preferred examples of such precursors are suitable inorganic sulphides, particularly alkali or alkaline earth metal and ammonium sulphides and their sulphhydrates e.g. sodium sulphide, potassium sulphide, calcium sulphide and sodium sulphhydrate. Suitable organic precursors of hydrogen sulphide may be used, such as thioamides, e.g. thioacetamide, thioacids, e.g. thioglycolic acid, and salts and esters thereof, and certain mercaptoamides and mercaptoacids capable of releasing H₂S e.g. 50 55 60 65 70 75 80 85 90 2-mercaptopamides and 2-mercaptoacids and salts and esters thereof.

The preparation of flavouring substances from a mixture of monosaccharide and cysteine, optionally containing other amino acids, is disclosed in British Specification No. 836,694. Cysteine has now been found to be a source of hydrogen sulphide under the reaction conditions leading to production of flavouring substances from these mixtures and accordingly the use of cysteine or sources of cysteine as the sole hydrogen sulphide source is no part of the present invention. In any case we have found that the preferred amounts of hydrogen sulphide are not given except at the highest levels of cysteine.

One or more, preferably three or more, amino acids, are used, preferably selected from glycine, alanine, proline, hydroxyproline, threonine, arginine, glutamic acid, aspartic acid, histidine, lysine, leucine, isoleucine, serine, valine and taurine. Smaller amounts of tyrosine, tryptophan, cysteine, phenylalanine and methionine are not objectionable but large amounts should be avoided, as they may give rise to undesir-

able bitter, floral or potato-like aromas. Di, tri or higher peptides, or protein, giving rise to the requisite amino acids can also be used in the reaction. Protein hydrolysates such as wheat gluten hydrolysate or casein hydrolysate are convenient sources. Glutamic acid and salts thereof, e.g. monosodium glutamate are other convenient sources.

5 The reaction can be carried out in the presence of water or optionally in the presence of water and fatty material. The fatty material can be a fat e.g. lard or beef dripping, an oil, e.g. groundnut oil or a higher fatty acid, e.g. oleic acid.

10 Factors which affect the nature and quality of the flavour produced include the nature and relative amounts of monosaccharide, amino acid, and fatty material, the amount of hydrogen sulphide, the amount of water and the temperature and time of reaction.

15 As little as 5 parts by weight of monosaccharide per 100 parts by weight of amino acid can give a satisfactory flavour. Amounts of monosaccharide up to 150 parts by weight of hydrogen sulphide per amino acid can be used. As greater amounts are used excessive sweetness of flavour is developed with some sugars. Generally it is preferred to use 10 to 50 parts by weight of monosaccharide per 100 parts by weight of amino acid.

20 It is necessary to control carefully the amount of hydrogen sulphide used to avoid overpowering the flavour of the product with sulphurous notes. As little as 0.25 parts by weight of hydrogen sulphide per 100 parts by weight of amino acid available, in total, during the reaction can give rise to flavouring substances. Amounts of hydrogen sulphide up to 20 parts per 100 parts of amino acid are acceptable but greater amounts give rise to sulphurous flavour notes. Generally it is preferred to have available from 0.5 to 5 parts of hydrogen sulphide per 100 parts of amino acid.

25 The reaction mixture must contain at least a trace of water. When small amounts of water are used the reaction mixture may be in the form of a solution or in the form of a suspension or paste. Also, water bound as water of crystallisation, for example in sodium sulphide nonahydrate, can be sufficient. Conveniently the amount of water is between 0.5 and 12.5 times by weight of amino acid; greater or smaller amounts, however, give satisfactory flavours.

30 The pH at which the reaction is carried out is not critical. It must be compatible with the controlled formation of hydrogen sulphide for the reaction. The initial pH of the mixture can be alkaline, for example pH 7 to 10. During the reaction the pH falls slowly, e.g. to pH 3 to 6, allowing for slow formation of hydrogen sulphide in the case of inorganic hydrogen sulphide sources.

35 The temperature of the reaction is not critical, but is preferably higher than 80°C. Temperatures as high as 150°C may be used. The reactions are most conveniently carried out by heating the mixture under reflux in which case the mixture is generally maintained at its boiling point for 15 minutes to 6 hours, generally at least one hour. At lower temperatures for example 70°C, a rather longer heating time may be necessary for example 24—30 hours. The process can also be carried out under reduced pressure or under increased pressure when the temperature (at boiling) will be lower or higher respectively, and heating times will be adjusted accordingly.

40 Stirring the mixed reactants during heating is desirable in order to reduce the risk of local overheating and to disperse fatty ingredients when added. Conditions of reaction should for best results be such as to avoid substantial charring of the mixture.

45 The reaction products can be used as such or, for example, they can be converted into powder by any suitable method of drying. When spray- or freeze-drying mixtures containing fat it is desirable to disperse the fat with a suitable emulsifying agent and then mix it with an inert vehicle such as cornflour suitable for use in the spray drying or freeze drying processes.

50 The reaction can also be carried out in the presence of the food product in which it is desired to incorporate a savoury or meat-like flavour by incorporating the reactants and heating the product to effect reaction, for instance by autoclaving in a sealed can. When carrying out the reaction by adding the reactants to a food product it is sometimes necessary to add a small amount of water, but generally such products will already contain sufficient water to enable the reaction to proceed.

55 Flavouring substances according to the invention may be incorporated into a wide range of food products where a meat like or savoury flavour is desirable. They may be incorporated on their own as solutions or powders or in conjunction with other flavouring agents or enhancers such as monosodium glutamate or nucleotides as convenient, in among other things, soups and dry soup mixes, casserole dishes, luncheon meats, sauces, gravies, steaws simulated meat products, meat spreads and dips, and pet foods.

60 The flavouring substances according to the invention may be used in virtually any concentrations. For example, they may be sold undiluted for use as a condiment, or when used as a condiment may be incor-

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porated into food in very small amounts. As further examples, they may be used in about 50% by weight concentration as a meat-flavoured spread, or may be used in soups in concentrations as low as 0.1% or less. In particular less of the flavouring substance will be used when it is incorporated into foodstuffs together with other flavours, e.g. monosodium glutamate and ribotides.

The following examples, in which percentages are by weight illustrate the invention.

EXAMPLE 1

To a mixture of wheat gluten hydrolysate of 40% solids, pH 5.8 (20% amino acids) (1.03 Kg) and *D*-xylose (88.5 g) was added sodium sulphide nonahydrate (34 g) the solution was heated under reflux for 3 hours at a bath temperature of 130—140°C. After cooling to about 60°, cornflour (414 g) was added and the solution was freeze-dried to a brown powder, which had a savoury meaty flavour.

EXAMPLE 2

Wheat gluten hydrolysate, *D*-xylose and sodium sulphide nonahydrate were reacted together in the same amounts and under the same conditions as in Example 1. The product was spray dried onto cornflour to give a savoury meaty product.

EXAMPLE 3

A solution of monosodium glutamate (80 g) in water was adjusted to pH 5.7 by the addition of hydrochloric acid. *D*-xylose (17.7 g) was added and the total volume was made up to 180 ml with water. Finally, sodium sulphide nonahydrate (6.8 g) was added and the solution was heated for 3 hours under reflux at a bath temperature of 130—140°C. After cooling to about 60°C cornflour (82.8 g) was added and the mixture was freeze-dried to give a brown powder having a desirable savoury flavour.

EXAMPLE 4

To a mixture of wheat gluten hydrolysate (as used in Example 1) (10 g, 8.4 ml) and *D*-xylose (0.59 g) was added sodium sulphide nonahydrate (0.09 g) and the mixture was heated under reflux for 3 hours as in Example 1. After cooling the product was freeze-dried to a meat-flavoured brown powder without addition of cornflour.

EXAMPLE 5

A solution of monosodium glutamate (8.0 g) in water was adjusted to pH 5.7 with hydrochloric acid. *D*-Ribose (1.77 g) was added and the volume was made up to 18 ml with water. After addition of sodium sulphide nonahydrate (0.68 g), the mixture was heated under reflux for 3

hours. The product was freeze-dried to a brown powder, which had a savoury meat flavour.

EXAMPLE 6

To a mixture of wheat gluten hydrolysate (10 g) and *D*-glucose (0.708 g) was added sodium sulphide nonahydrate (0.251 g) and the solution was heated under reflux for 5 hours (Bath 130—140°C). After cooling the product was freeze-dried to a brown powder, which had a savoury meat flavour.

EXAMPLE 7

To a mixture of wheat gluten hydrolysate (50 g) *D*-xylose (2.145 g) and *D*-glucose (2.575 g) was added sodium sulphide nonahydrate (1.652 g). The solution was heated under reflux for 3 hours. After cooling to about 60°C, cornflour (13.8 g) was added and the product was freeze-dried to a brown powder, which had a desirable meaty flavour.

EXAMPLE 8

A solution of *L*-histidine (2.422 g) in water was adjusted to pH 5.7 with hydrochloric acid and *D*-xylose (0.59 g) was added and the volume was made up to 6 ml with water. Sodium sulphide nonahydrate (0.2267 g) was added and the mixture was heated under reflux for 3 hours. The product was freeze-dried to yield a meat-flavoured brown powder.

EXAMPLE 9

A solution of glutamic acid (0.680 g), glycine (0.835 g), alanine (0.646 g), leucine (0.0627 g), tyrosine (0.390 g) and histidine (0.0457 g) in water was neutralised to pH 5.7 with hydrochloric acid. *D*-xylose (0.59 g) was added and the volume made up to 100 6 ml with water. After addition of sodium sulphide nonahydrate (0.2267 g), the mixture was heated under reflux for 3 hours. The product was freeze-dried to a brown powder, which had a savoury meat flavour.

EXAMPLE 10

To a solution of spray dried casein hydrolysate (3.66 g) and xylose (0.59 g) in water (10 ml) was added sodium sulphide nonahydrate (0.254 g) and the mixture was heated under reflux for 3 hours. After cooling, the product was freeze-dried to a brown powder, which had a good meaty flavour.

EXAMPLE 11

To a solution of histidine (0.225 g), tyrosine (0.1875 g), glutamic acid (4.25 g), alanine (0.310 g), leucine (0.310 g) and glycine (0.4125 g) in water (22.8 ml) was added *D*-glucose (1.14 g) and sodium sulphide nonahydrate (1.620 g) and the solution was heated for 6 hours under reflux (bath temperature 130°C). After cooling,

cornflour (16.56 g) was added and the product was freeze-dried to yield a powder having a savoury, meaty flavour.

EXAMPLE 12

5 A solution of monosodium glutamate (8.73 g) in water was neutralised to pH 5.7 (HCl) and the volume made up to 5.32 ml. After addition of *D*-arabinose (0.532 g) and calcium sulphide (0.483 g), the solution 10 was heated for 24 hours at 70°C. After addition of cornflour (22.08 g) the product was freeze-dried to yield a product having a savoury meaty flavour.

EXAMPLE 13

15 To a mixture of aspartic acid (1.14 g), glycine (0.57 g), tryptophan (0.095 g) and cysteine (0.095 g) in water (2.13 ml) and oleic acid (2.13 g) was added *D*-xylose (2.13 g) and sodium sulphide nonahydrate (0.067 g). The mixture was heated at 140°C 20 for 10 minutes with vigorous stirring. After cooling, the solution was diluted with water, 5.52 g cornflour was added and the product was freeze-dried to yield a meat-flavoured brown paste.

EXAMPLE 14

To a mixture of monosodium glutamate (3.04 g) glycine (0.418 g), hydroxyproline (0.076 g), phenylalanine (0.114 g), taurine (0.076 g) and cystine (0.076 g) in water (21.3 ml) and lard (42.6 g) was added *D*-ribose (4.26 g) and the mixture was heated to 130°C to melt the fat. H₂S (0.38 g) was slowly passed through the vigorously 30 stirred solution and heating at 130° was continued for 60 minutes. After cooling and addition of cornflour (11.04 g) the product was freeze-dried to a brown paste having a savoury meaty flavour.

EXAMPLE 15

To a mixture of casein hydrolysate (10.98 g) and *D*-glucose (0.399 g) in water (3.99 ml) and hydrogenated groundnut oil (3.99 g) was added sodium sulphide nonahydrate (4.02 g). The resultant mixture was vigorously stirred and heated for 20 minutes at 140°C. To the cooled product was 45 added cornflour (16.56 g) and freeze drying yielded a meat-flavoured brown paste.

EXAMPLE 16

A mixture of wheat gluten hydrolysate (40% solids, 10 g), *D*-ribose (0.38 g) and sodium sulphide nonahydrate (0.268 g) was placed in a Carius tube and sealed at ca 55 -80°C. The sealed tube was heated at 100°C for 3 hours when it was again cooled and opened. Cornflour (5.52 g) was added to the contents and the mixture was freeze-dried. The product was a savoury, meat-flavoured brown powder.

EXAMPLE 17

To a mixture of histidine (0.185 g), tyrosine (0.154 g), glutamic acid (3.485 g) and *D*-ribose (1.52 g) in water (15.2 ml) was added sodium sulphide nonahydrate (1.118 g) and the mixture was heated under reflux (bath temperature 130°C) for 3 hours. Cornflour (11.04 g) was added and the product freeze-dried to yield a meat-flavoured 65 70 powder.

EXAMPLE 18

A solution of histidine (0.278 g), tyrosine (0.231 g) and glutamic acid (5.24 g) in water was adjusted to pH 4.0 with HCl, *D*-xylose (0.57 g) and *D*-glucose (0.57 g) 75 were added to this solution and the volume made up to 22.8 ml. Through this solution, heated under reflux in a 130°C bath, was passed slowly, in a stream of nitrogen, hydrogen sulphide (ca 0.28 g) generated from wheat gluten hydrolysate (63.40 g) and sodium sulphide nonahydrate (1.69 g) also at 130° (bath). Heating was continued for 6 hours after which cornflour (16.56 g) was added and the product freeze-dried to yield a meat-flavoured 80 85 powder.

EXAMPLE 19

A mixture of histidine (0.0752 g), tyrosine (0.0626 g), glutamic acid (1.416 g), glycine (0.1374 g), alanine (0.1063 g), leucine (0.1032 g) in water was adjusted to pH 6 (NaOH). Glucose (0.76 g) and sodium sulphide nonahydrate (0.268 g) were added, the volume was made up to 7.6 ml with water and heated with stirring under reflux in a 130°C bath for 6 hours. After cooling, cornflour (5.52 g) was added and the product was freeze-dried to yield a meat-flavoured powder.

EXAMPLE 20

A solution of histidine (0.1504 g), tyrosine (0.1252 g), glutamic acid (2.8320 g), glycine (0.2748 g), alanine (0.2126 g) and leucine (0.2064 g) in water was adjusted to pH 9 (NaOH). *D*-Ribose (4.56 g) was 105 added and after making up to 91.2 ml with water, the solution was heated under reflux (130°C). Hydrogen sulphide (ca 0.076 g), generated from wheat gluten hydrolysate (21.05 g) and sodium sulphide nonahydrate (0.564 g) also at 130°C, was slowly passed through the reaction mixture in a stream of nitrogen and heating was continued for 3 hours. Cornflour (11.04 g) was added and the product was freeze-dried to yield a 110 115 savoury, meat flavoured powder.

EXAMPLE 21

A stirred solution of wheat gluten hydrolysate (40% solids, 10 g), *D*-xylose (0.38 g) and sodium sulphide nonahydrate (0.268 g) 120 in water (70 ml) was heated under reflux in a 130°C bath for 4 hours. Cornflour

(5.52 g) was added and the product freeze-dried to yield a brown powder having a good meaty flavour.

EXAMPLE 22

5 A mixture of monosodium glutamate (5.33 g), D-xylose (1.18 g) and sodium sulphide nonahydrate (0.453 g) in hydrogenated groundnut oil (12 g) was heated with stirring at 100°C for 3 hours. After cooling a large excess of water was added followed by cornflour (5.52 g) and the product was freeze-dried to a meat-flavoured brown paste.

EXAMPLE 23

15 A solution of wheat gluten hydrolysate (40% solids, 20 g), fructose (1.14 g) and sodium sulphide nonahydrate (0.1338 g) was heated with stirring at 90°C for 4 hours. After cooling, cornflour (11.04 g) was added and the product was freeze-dried to yield a powder having a savoury meaty flavour.

EXAMPLE 24

25 A solution of wheat gluten hydrolysate (40% solids, 10 g), maltose (0.38 g) and sodium sulphide nonahydrate (0.268 g) was heated under reflux (bath temperature 130°C) for 3 hours. Cornflour (5.52 g) was added after cooling and the product was freeze-dried to yield a powder having a savoury meaty flavour.

EXAMPLE 25

To a solution of alanine (3.8 g) and isoleucine (3.8 g) in water (10 ml) was added 35 D-xylose (1.52 g) and sodium sulphide nonahydrate (1.14 g). The resulting slurry was heated with stirring at a bath temperature of 130°C for 3 hours. The resulting product was diluted with water, cornflour (22.08 g) was added and the product was freeze dried to yield a meat-flavoured powder.

EXAMPLE 26

45 A mixture of histidine (0.185 g), tyrosine (0.154 g), glutamic acid (3.485 g) and D-ribose (0.38 g) in water (15.2 ml) was heated to 130°C. Hydrogen sulphide (0.076 g), produced from sodium sulphide nonahydrate and wheat gluten hydrolysate at 50 130°C, was slowly passed through this solution in a stream of nitrogen and heating was continued for 3 hours. After cooling cornflour (11.04 g) was added and the product was freeze-dried to yield a savoury powder.

EXAMPLE 27

55 A solution of monosodium glutamate (8.73 g) and D-xylose (0.532 g) in water (10.64 ml) was heated under reflux in a 60 130°C bath and hydrogen sulphide (0.038 g), prepared from a mixture of sodium sulphide nonahydrate and wheat gluten hydrolysate also at 130°C, was slowly passed

through the solution in a stream of nitrogen. Heating was continued for 3 hours when cornflour (22.08 g) was added and the product was freeze-dried, yielding a meat-flavoured powder.

EXAMPLE 28

A stirred solution of wheat gluten hydrolysate (40% solids, 10 g), D-ribose (0.38 g) and thioacetamide (0.0838 g) was heated under reflux (130° bath) for 3 hours. After the addition cornflour (5.52 g) the product was freeze-dried, yielding a meat flavoured powder.

EXAMPLE 29

100 Parts of the flavour booster prepared in Example 2 were mixed with 50 parts of monosodium glutamate and 2 parts of a 50—50 (by weight) mixture of disodium inosinate and disodium guanylate were added. A flavour booster having an excellent savoury and meaty flavour was obtained.

EXAMPLE 30

To 17.3 ml of wheat gluten hydrolysate (40% solids) were added 1.77 g of D-xylose and 0.74 g of thioglycollic acid. This mixture was heated in a bath at a temperature of 140°C for 3 hours. 5.52 g of cornflour were added and the product was freeze-dried to yield a savoury powder.

EXAMPLE 31

A solution of monosodium glutamate (8.7 g adjusted to pH 5.7) D-xylose (2.36 g) and thioglycollic acid (0.985 g) made up to a total volume of 24 ml with water were heated at 140°C for 3 hours. 11 g of cornflour were added and the product was freeze-dried yielding a savoury powder.

EXAMPLE 32

To a powdered dried kidney soup comprising flour, potato starch, sugar, fat, salt, kidney, beef, mushroom, a nucleotide mixture, caramel and spices was added 3.1% by weight of the spray dried flavouring agent prepared in Example 2. The product had an enhanced meaty flavour when compared with a similar kidney soup to which the flavouring agent according to the invention had not been added.

EXAMPLE 33

To the ingredients of a casserole containing ring noodles, dried beef, dried potatoes, edible starch, dried onions, sugar, hydrolysed protein, edible fat, beef dripping, salt, dried green peppers, monosodium glutamate, and spices (total weight 130 g) in 500 ml water was added wheat gluten hydrolysate (40% solids, 2.98 g), D-xylose 120 0.254 g and sodium sulphide nonahydrate (0.237 g) and the casserole was covered and heated at 150°C for 2 hours when the

product was assessed for flavour. In a comparative test, a small taste panel preferred the product to a similar casserole to which the hydrolysate, xylose and sodium sulphide had not been added.

As stated above, the use of cysteine or sources of cysteine as the sole hydrogen sulphide source forms no part of this invention.

10 Subject to the foregoing disclaimer,
WHAT WE CLAIM IS:—

1. A process for preparing a flavouring substance which comprises reacting together a monosaccharide or a polysaccharide capable of yielding a monosaccharide under the reaction conditions, one or more amino acids and hydrogen sulphide or a substance giving rise to hydrogen sulphide under the reaction conditions, in the presence of water at a temperature above 60°C until a flavouring substance is produced, the pH of the reaction mixture being not more than 7 at the end of the reaction.
2. A process according to Claim 1, in which at least 0.25 parts by weight of hydrogen sulphide per 100 parts of amino acid are available in total during the reaction.
3. A process according to Claim 2, in which the amount of hydrogen sulphide available is not more than 20 parts by weight per 100 parts of amino acid.
4. A process according to Claim 3, in which the amount of hydrogen sulphide available is 0.5 to 5 parts by weight per 100 parts by weight of amino acid.
5. A process according to any preceding claim, in which hydrogen sulphide gas is passed into the reaction mixture.
6. A process according to any of Claims 1 to 4, in which the source of hydrogen sulphide is an inorganic sulphide.
7. A process according to Claim 6, in which the source of hydrogen sulphide is sodium sulphide.
8. A process according to Claim 6, in which the source of hydrogen sulphide is calcium sulphide.
9. A process according to any one of Claims 1 to 4, in which the source of hydrogen sulphide is an organic sulphur compound capable of giving rise to hydrogen sulphide under the reaction conditions.
10. A process according to Claim 9, in which the hydrogen sulphide source is a thioamide or a thioacid or a salt or ester thereof.
11. A process according to Claim 10, in which the hydrogen sulphide source is thioacetamide.
12. A process according to Claim 10, in which the hydrogen sulphide source is thioglycolic acid or a salt or ester thereof.
13. A process according to Claim 9, in which the hydrogen sulphide source is a 2-mercaptoproamide or a 2-mercaptoproacid or a salt or ester thereof.
14. A process according to any preceding claim, in which 3 or more amino acids are present.
15. A process according to any preceding claim, in which a protein hydrolysate is used as the amino acid component.
16. A process according to any one of Claims 1 to 13, in which the amino acid is glutamic acid or a salt thereof.
17. A process according to Claim 15, in which the amino acid is monosodium glutamate.
18. A process according to any preceding claim, in which the amount of water is at least 0.5 parts by weight per part of amino acid present.
19. A process according to Claim 18, in which the amount of water is between 0.5, and 12.5 parts by weight per part of amino acid.
20. A process according to any preceding claim, in which the ratio of monosaccharide to amino acid is between 5 and 150 parts by weight of monosaccharide per 100 parts of amino acid.
21. A process according to Claim 20, in which 10 to 50 parts by weight of monosaccharide are present per 100 parts of amino acid.
22. A process according to any preceding claim, in which the monosaccharide is ribose.
23. A process according to any one of Claims 1 to 21, in which the monosaccharide is xylose.
24. A process according to any one of Claims 1 to 21, in which the monosaccharide is glucose.
25. A process according to any one of Claims 1 to 21, in which a mixture of monosaccharides is used.
26. A process according to any preceding claim, in which the reaction is carried out at a pH of between 3 and 6.
27. A process according to Claim 1, in which the temperature is higher than 80°C.
28. A process according to any one of Claims 1 to 27, in which heating is carried for from 15 to minutes to 6 hours under reflux.
29. A process according to any preceding claim in which a fatty material is present during the reaction.
30. A process according to any preceding claim, in which the flavouring substance is produced *in situ* in a food product by incorporating the reactants in a food product and heating.
31. A process for preparing a flavouring

substance substantially as described in any flavouring substance according to Claim 32.
one of the Examples.

32. A flavouring substance made by the
process of any preceding claim.

5 33. A food product containing a

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